

REMARKS

Claims 1-32 were pending, of which Claims 1-21 are withdrawn and Claims 22-32 were rejected. Claims 22-24, 27-29, and 31 have been amended and Claim 26 has been cancelled.

Claim 22 has been amended to incorporate the subject matter of Claim 26 and Claim 26 has been cancelled. Additionally, Claims 22-24, 27-29, and 31 have been amended to correct typographical errors not for reasons related to patentability. Thus, no new matter has been added.

Claim Rejections – 35 U.S.C. §103

Claims 22-32 were rejected under 35 U.S.C. §103(a) as being unpatentable over Horiuch et al., (6,492,250) (“Horiuch”) in view of Shinmura (6,281,052) (“Shinmura”). Reconsideration is requested.

Independent Claim 22 recites “a polysilicon structure formed upon a substrate and having laterals”, “an insulating structure disposed on said laterals of said polysilicon structure for insulating said polysilicon structure”.

Horiuch does not disclose an “insulating structure disposed on said laterals of said polysilicon structure” despite the Examiner statement to the contrary. Horiuch discloses a “metallic oxide layer 360 [that] is formed on the sidewalls of the retained silicide layer 330 by oxidation.” Col. 3, lines 63-65. Horiuch does not disclose an insulating structure on the laterals of the polysilicon structure, i.e., layer 320 in Fig. 3C. Horiuch only discloses that the exposed polysilicon layer 320 is etched with an anisotropic etching operation to form the gate polycide structure 380, along with the silicide layer 330. Col. 4, lines 3-8. There is no teaching, suggestion or motivation in Horiuch to form an insulating structure on the laterals of the polysilicon structure.

Additionally, Claim 22 has been amended to recite “a silicide structure formed upon said polysilicon structure and having laterals” and “a protecting structure formed by means of chemical vapor deposition (CVD) on said laterals of said silicide structure for protecting said silicide structure,” which Horiuch fails to teach or disclose. As discussed above, Horiuch discloses that the metallic oxide layer 360 that is formed on the sidewalls of the retained silicide layer 330 is formed by oxidation. Col. 3, lines 63-65. These two formation methods are very different. Furthermore, as described in the specification of the present application,

the use of the protecting structure is advantageous as it “could resolve the problem of the pollutant oxide produced by the tungsten layer [in the silicide layer] at high temperature and conforms to industrial environmental consciousness.” Paragraph 45. The metallic oxide layer of Horiuch, however, is formed from the metallic element within the silicide layer 330 (col. 4, lines 26-28), which may be a tungsten silicide layer. Col. 4, lines 16-17. Thus, Horiuch teaches what the present application is attempting to avoid. Accordingly, the structures claimed in Claim 22 and disclosed in Horiuch are very different.

The Examiner cited to Shinmura as disclosing “a protecting structure disposed on said laterals on said silicide structure of protecting said silicide structure at column 4, lines 66-67.” As discussed above, Horiuch already discloses a “metallic oxide layer 360 [that] is formed on the sidewalls of the retained silicide layer 330 by oxidation.” Col. 3, lines 63-65. The addition of Shinmura’s “protecting structure” i.e., the silicon oxide sidewalls, on top of the metallic oxide layer 360 of Horiuch would result in a structure very different from what is claimed.

Moreover, Applicant asserts that the silicon oxide sidewalls 22 as disclosed in Shinmura are not “an insulating structure disposed on said laterals of said polysilicon structure for insulating said polysilicon structure.” The silicon oxide sidewalls 22 cover the entire sidewalls of the gate electrode (col. 5, lines 1-2), as opposed to being merely “disposed on said laterals of said polysilicon structure” as recited in Claim 22.

In addition, Applicant asserts that there is no suggestion or motivation to combine Horiuch with Shinmura. The Examiner stated that it would have been obvious to make such a combination “since such a modification would result in eliminating breakdown voltage, as described in column 2, lines 39-44 of Shinmura.” Applicant points out, however, that Shinmura does not teach or suggest that the silicon oxide film eliminates breakdown voltage. In fact, Shinmura states at lines 39-44 that the object of Shinmura’s invention is to provide a “method of manufacturing a semiconductor device having a titanium polycide film in which a titanium nitride film, which does not affect the breakdown voltage of the gate oxide film and which has a high barrier performance, is intervened.” Accordingly, contrary to the Examiner’s statement, one of ordinary skill in the art would not modify Horiuch to add the silicon dioxide sidewalls of Shinmura in order to eliminate breakdown voltage.

Thus, Applicant asserts that the Examiner's combination of Horiuch and Shinmura is not based on an explicit or implicit suggestion found in the references, but is in fact based on an improper hindsight analysis.

Thus, Applicant respectfully submits that Claim 22 is patentable over the combination of Horiuch and Shinmura. Reconsideration and withdrawal of this rejection is respectfully requested. Claims 23-25 and 27-32 depend from Claim 22 and are, therefore, likewise patentable.

Moreover, neither Horiuch nor Shinmura disclose "said silicide structure upon said polysilicon structure comprises a barrier, a tungsten layer and a silicon nitride (SiNX) layer in sequence" as recited in dependent Claim 24. Applicant points out that the Examiner's citation to col. 3, lines 36-38 refers to the insulation layer 340, not the silicide structure. Thus, Claim 28 is patentable over Horiuch and Shinmura.

Dependent Claim 28 recites "said protecting structure is silicon nitride (SiNX)" and Claim 32 recites "said protecting structure is defined via an anisotropic dry etcher" As discussed above, Horiuch discloses that the "metallic oxide layer 360 is formed on the sidewalls of the retained silicide layer 330 by oxidation." Col. 3, lines 63-65. Thus, Claims 28 and 32 are patentable over Horiuch and Shinmura.

Dependent Claim 30 recites "said insulating structure is formed by means of a dry oxidation method" where the insulating structure is on the laterals of the polysilicon structure in Claim 22. The metallic oxide layer 360 of Horiuch is on the sidewalls of the silicide layer 330 and, thus, does not correspond to the insulating structure of Claims 22 and 30. Moreover, the silicon oxide sidewalls 22 of Shinmura is produced by CVD. Col. 4, lines 66-67. Thus, Claim 30 is patentable over Horiuch and Shinmura.

Claims 22-24, 27-29, and 31 have been amended and Claim 26 has been cancelled leaving Claims 22-25 and 27-32 pending. For the above reasons, Applicants respectfully request allowance of all pending Claims. Should the Examiner have any questions concerning this response, the Examiner is invited to call the undersigned at (408) 982-8202.

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